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Accident Alert System and Intimation for Ambulance and Hospital using LORA

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Abstract:- **In today's scenario the usage of vehicles have increased at a larger scale. The increased vehicular traffic has also increased the traffic and the road accidents take place frequently which causes loss of life and property because of the poor emergency facilities. Due to huge traffic, emergency vehicles like ambulances are not able to reach their destinations in time, resulting into loss of human lives. This paper will provide an optimum solution to this draw back. Coverage includes accident detection, emergency ambulance transportation by a licensed ambulance service from the location of the sudden accident to the nearest hospital where Emergency health services can be performed. For this purpose we have implemented an effective ambulance system by using GPS and COLLISION sensor along with LoRa technology.**

Keywords: Accident detection; emergency ambulance transportation; Long Range (LoRa) Technology

1. INTRODUCTION

The usage of motor vehicles is growing at a fastest rate as the population increases. Accidents and the death rate are highly increased due to the irregular management of traffic. Mostly, deaths due to accidents are happened due to the time lagging of medical assistance. Majorly it was happened in highways to rectify this problem we have proposed a system.

The proposed system is used to increase life time of patient. This action is done by sending a reliable data of an accident to the hospital and medical assistance for immediate recovery. The time efficiency of this system has faster than the before cases.

The accident alert and detection system has been designed by android software. In this case, the heartbeat sensor and accelerometer are using to detect the accident and transmitted via Bluetooth module [1]. Automatic alerts system inbuilt a vehicle .automatic system has been analyzed accident due to over speed and detected to GPS module and finally transmitted the detail to server by the aid of GSM module [2]. Car accident detection and notify using smart phones. Car accident system detects through an accelerometer sensors and the analyze data are send through a GPS module and GSM module in Smart phones [3].

The rest of the paper is organized is below: section II describes the proposed real time accident alert system and intimation for ambulance and hospital using lora. Simulation result is shown and described in section III. Finally we have conclusion in section IV.
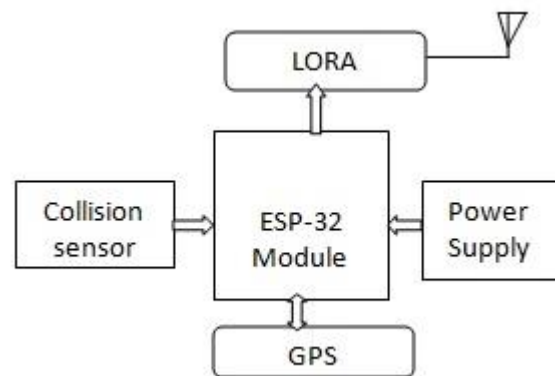
2. SYSTEM DESCRIPTION

Fig.1 Block Diagram of ESP-32 Module

Block diagram of this proposed system is shown in fig 1. in this proposed system can detect the accident using collision sensor. Collision sensor measures the vibration depending upon the amount of vibration during accident. The vibration should be effective enough to identify that it is an accident. And this sensor is connected to ESP-32 module. This strong vibration an accident due to will send the signal to ESP-32 module. We have a threshold value from the output of the sensor. When the threshold value is crossed than it indicates the accident has happened [4]. If suppose the sensor is broken then the server is intimated a police or government would check the server and send the ambulance if needed.

The system uses GPS module and this is connected to ESP-32 module which calculates the coordinates (longitude and altitude). These coordinates with time and vehicle number will be sending to nearest 10km radius ambulance and any government server for emergency medical assessment of that people. These coordinates transmitted via lora due to accident time. And GPS module used here is to detect the perfect location of accident place and is compact, high performance, high performance to transmitted data and low power consumption GPS module. At the same time the lora which is placed inside the vehicle is also transmitted data in high speed and taken a very less time to share the data [5]. And the lora used to shared data with ambulance and

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any government server and also to nearest hospital without any barriers. Block diagram of the proposed receiving system is as shown in Fig 2. Here our receiver system can receive the signal or message through a Lora. Lora at the receiver side can detect the same Lora from transmitted signal.
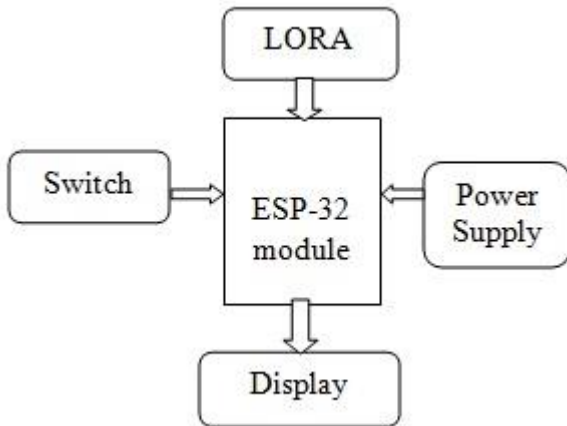

Fig.2 Block Diagram of Receiver System (Ambulance)

Then the signal transmitted to esp-32 module is received by the ambulance. This message can display at a fraction of seconds. The led display used to display the location coordinates of the accident place. Then the nearest ambulance driver receives the message at the time of response, the Lora sends acknowledgement to other ambulances that an ambulance has already been sent with medical assessment with the help of a switch [6]. This switch is used to send an acknowledgement signal due to this any ambulance can accept the signal and they will send an acknowledgement within 10 km radius ambulances. This helps in avoiding the collision of various ambulances in the same spots.
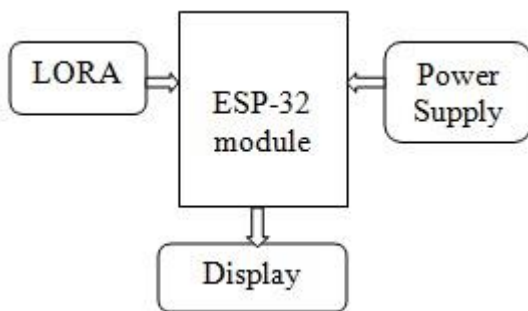

Fig.3 Block Diagram of Receiver System (Hospital)

Block diagram of proposed receiving system at hospital side is as shown Fig.3. Similarly the receiver side systems of ambulance modules are used.

➢ Collision Sensor
The input for the collision sensors will be physical quantities or frequency. And the output is in voltage format. Collision sensor is also called as impact sensor. Mostly the collision sensor represents the collision by the detection of displacement, velocity and acceleration [8]. The sensitivity of sensors range between 10 and 100mV/g with higher and lower sensitivities is also there.

➢ ESP-32 Module
It is a wifi and Bluetooth module. It is important to remember that the esp-32 has 3 chips: flash memory, espressif, which is the processor of tensilica, and also there is a USB to serial TTL of silicon base. In the case of this development kit, we also have a fourth chip, which is the sx1276. Its memory is 520kib SRAM. And the power supply is 3.3v DC. It is created and developed by espressif system. It is a developed version of esp8266 microcontroller.

➢ GPS
It stands for global positioning system. The original name for GPS is NAVSTAR GPS. It does not require the user to transmit any data and it operates independently of any internet reception. These technologies can enhance the usefulness of GPS positioning information.
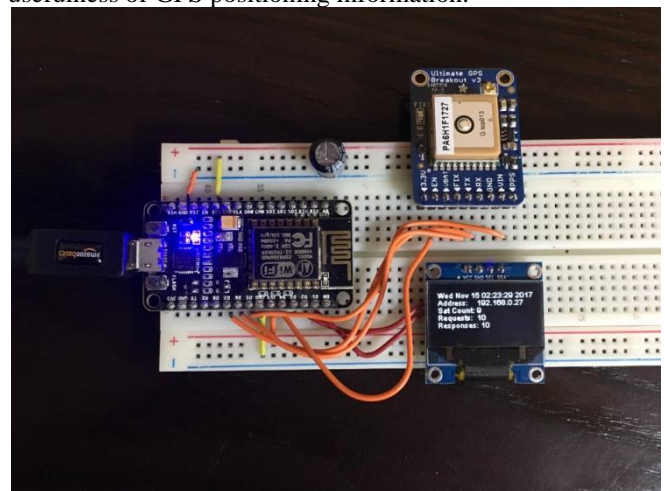

Fig.4 Prototype of GPS for EPS 32 Module

➢ LORA TRANSCEIVER
It stands for long range. It is a transceiver and its range is around 10km. it is used in low power wide area network (LPWAN). It works under 868&900MHz. the frequency band range for USA is 902-928 and Europe is 863-870MHz for Asian countries it is 923MHz. three features of LORA are good sensitivity, low obstacle penetration [7]. It is a secured network.
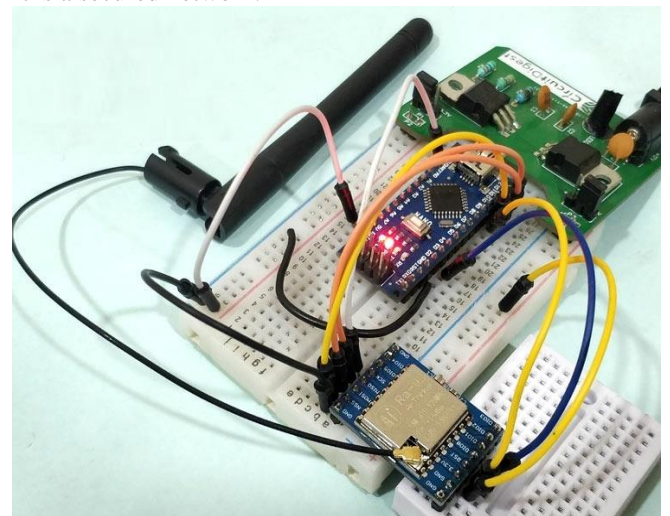

Fig.5 Prototype of LORA Transceiver

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➤ *LED DISPLAY*

It stands for light emitting diode display. Devices called "nanorods" are a form of LEDs that can also detect and absorb light.
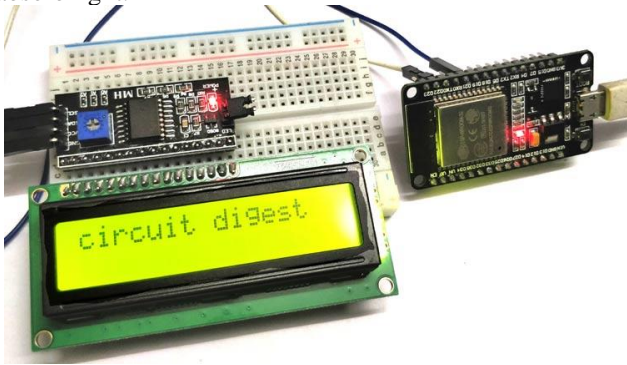

Fig.6 Prototype of LED Display

3. WORKING PRINCIPLE

The system comprises of a Lora transmitter, Lora transmitters are embedded inside the dashboard of the vehicle during the manufacturing of the vehicles. Along with this a vibration sensor, a MEMS sensor, GPS and GSM modules are also embedded in the design of the vehicle. At the time of accident, the vehicle exhibits abnormal vibrations and also it gets tilted (the position of the vehicle gets changed both horizontally and vertically) these abnormalities are sensed and sent to the ESP Module. The vibration sensor senses the vibrations and the MEMS sensor senses the tilting of the vehicle and detects the occurrence of the accident, once the accident is detected using the GPS module the current location of the vehicle is recorded. GSM sends this recorded accident location to hospitals in the SMS format. Lora which stands for "Long Range" is used for far distance communication, with coverage of 10 kms. Thus the location of the accident through SMS is sent to the nearby hospitals within 10 kms range.

4. CONCLUSION

The new integrated and implemented into automotive system. It can offer to medical assistance to people injured in road accidents, reducing time delays and increase speed of data transfer time. It can overcome previous error innovations. This system is easily acceptance by the people. This system has integrated with collision sensor and LORA transceiver. In LORA used to easily data can transmitted upto 10kms need not any network module. Consequently, this paper can save the souls from wasting and unwanted time in accident.

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